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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 76) SC'd PCT/PTO 14 JAN 2005

Applicant's or agent's file reference	FOR FURTHER ACTION See Form PCT/IPEA/416									
9441wo/cf	The standard Clina data (daylor and brown)	Priority date (day/month/year)								
International application No.	International filing date (day/month/year)									
PCT/SE2003/001200	11-07-2003	16-07-2002								
International Patent Classification (IPC) or national classification and IPC										
B25J 19/00, H02G 11/00										
Applicant										
ABB AB et al										
This report is the international pre Authority under Article 35 and tre	 This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 									
2. This REPORT consists of a total	of 6 sheets, including this co	ver sheet.								
3. This report is also accompanied b	y ANNEXES, comprising:	·								
	and to the International Bureau) a total of									
and/or sheets	sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).									
sheets which beyond the d	supersede earlier sheets, but which this Autisclosure in the international application as f	nority considers contain an amendment that goes iled, as indicated in item 4 of Box No. I and the								
Supplementa Complementa										
b (sent to the Internation	onal Bureau only) a total of (indicate type ar									
, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).										
4. This report contains indications re	elating to the following items:									
	of the report									
Box No. II Priority	y									
Box No. III Non-es	stablishment of opinion with regard to novel	y, inventive step and industrial applicability								
Box No. IV Lack o	f unity of invention									
	Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement									
Box No. VI Certair	n documents cited									
Box No. VII Certair	n defects in the international application									
Box No. VIII Certair	Box No. VIII Certain observations on the international application									
Date of submission of the demand	Date of complet	ion of this report								
2 my or denimental or and deniment										
06-02-2004	12-10-20	04								
Name and mailing address of the IPEA/S	E Authorized office	ег								
Patent- och registreringsverket Box 5055										
S-102 42 STOCKHOLM	Ender Da	g /itw								
Facsimile No. +46 8 667 72 88	Telephone No.	+46 8 782 25 00								

International application No. PCT/SE2003/001200

Bo	x No. I	В	asis of the report		
1.	With	regard to the language, this report is based on the international application in the language in which it was filed, unles vise indicated under this item.			
		This rewhich	port is based on a translation from the original language into the following language, is the language of a translation furnished for the purposes of:		
			international search (under Rules 12.3 and 23.1(b))		
			publication of the international application (under Rule 12.4)		
			international preliminary examination (under Rules 55.2 and/or 55.3)		
2.			o the elements of the international application, this report is based on (replacement sheets which have been are receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" mexed to this report):		
		the inte	ernational application as originally filed/furnished		
	\boxtimes	the des	scription:		
		pages	1-9 as originally filed/furnished		
		pages*	received by this Authority on		
		pages*	received by this Authority on		
	\bowtie	the clai	ims:		
		pages	as originally filed/furnished		
		pages*	as amended (together with any statement) under Article 10		
		pages*	received by this Authority on 2004-07-14		
	5 2	pages*	received by this Authority on		
	\bowtie	the drav	wings:		
			1-3 as originally filed/furnished		
		pages*	received by this Authority on		
		pages*	received by this Authority on		
		a seque	nce listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.		
3.		The am	endments have resulted in the cancellation of:		
			the description, pages		
			the claims, Nos.		
			INC drawings sheets/figs		
			the sequence listing (specify):		
			any table(s) related to the sequence listing (specify):		
4.		This rep made, si 70.2(c))	ort has been established as if (some of) the amendments annexed to this report and listed below had not been ince they have been considered to go beyond the disclosure as filed, as indicated in the Surphysional Property of the considered to go beyond the disclosure as filed, as indicated in the Surphysional Property of the considered to go beyond the disclosure as filed, as indicated in the Surphysional Property of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed, as indicated in the Surphysion of the considered to go beyond the disclosure as filed as indicated in the Surphysion of the considered to go beyond the disclosure as filed as indicated in the Surphysion of the considered to go beyond the disclosure as filed as indicated to go beyond the considered to go beyond the co		
			the description, pages		
			the claims, Nos.		
			the drawings, sheets/figs		
			the sequence listing (specify):		
			any table(s) related to the sequence listing (specify):		
• <i>1</i>	f item 4	applies,	some or all of those sheets may be marked "superseded."		
orm I	CT/IPI	A/409 (Box No. D (January 2004)		

International application No.
PCT/SE2003/001200

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement					
1. Statemer	nt					
Nove	elty (N)	Claims Claims	1-8	YES NO		
Inver	ntive step (IS)	Claims Claims	1-8	YES NO		
Indus	strial applicability (IA)	Claims Claims	1-8	YES NO		

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report

D1: EP 0502832 A1 D2: JP 63180493 A D3: JP 2000078736 A

The applicant describes that there are problems with prior art cable connections between two parts of a robot, as they use cables that have to be guided through the device. Disassembly then becomes complicated and time consuming. A robot also often has to work in small or confined spaces, and housing a coil of cable and a cable-guiding device inside requires a relatively large amount of space, which is only available to a limited extent. The present invention intends to solve these problems.

Document D1 shows a cable connecting two rotating parts of a robot. The cable extends from the first part to the second part through an external cavity (5). A cable is prevented from being twisted when a body rotates.

D2 shows a wiring structure of a robot. The cable extends through a cavity and is connected to a part with a contact (18).

Document D3 shows wiring between rotating joints in a robot. The cable is guided through a cavity in the first joint to a cavity (5) in the second joint, where the cable is turned spirally around an axis of a rotating part. The spiral part is attached to the cavity (5) and is freely guided to the other side of the cavity (5).

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient. Continuation of: $Box\ V$

D1 represents the closest prior art document. The difference between D1 and the claimed invention, according to claims 1 and 8, is that the claimed invention provides an excess of cable extending freely through the internal cavity from the connection between the first and the second parts, which move relative to each other during operation. This excess of cable is wired inside the internal cavity to take up tension or slack in the cable caused by the movement of the parts. The cable is connected to at least one of the parts via a releasable contact point that is located inside the internal cavity. This provides a cable connection that is capable of accommodating cable length changes caused by the movements of one or both of the movable parts with a minimum space requirement.

The problem to be solved is to provide a contact point for the cable inside the internal cavity. The problem of having to guide the cable for a long distance in the robot is solved. D2 respectively D3 shows a wiring structure between rotating joints in a robot. The cable extends through a cavity and is freely guided to the other side of the cavity.

The problem to be solved in D2 respectively D3 does not address the same problem to be solved in the claimed invention. D2 describes the possibility for the cable to be connected to a part with a contact. D3 describes the possibility for the cable to turn spirally around an axis of a rotating part. However, D2 or D3 does not reveal an excess of cable which extends freely through the internal cavity and that at least one cable is connected to at least one of the movable parts via a releasable contact point located in the cavity.

The problem of the claimed invention is to allow rapid and simple assembly and disassembly to facilitate the replacement or maintenance of at least part of the cable.

Hence it is not obvious for a person skilled in the art to modify D1 with the help of D2 or D3 to solve the same problem as referred to in the claimed invention.

The invention according to claims 1-8 is thus novel and is

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In case the space in any of the preceding boxes is not sufficient. Continuation of: Box $\,V\,$

considered to involve an inventive step. The invention also has industrial applicability.

Form PCT/IPEA/409 (Supplemental Box) (January 2004)

International application No.
PCT/SE2003/001200

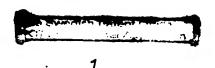
Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The reference in claim 2 relates to "any preceding claims". The reference is inconsistence to the referred and dependent claim. Therefore, the reference should be adjusted to the statement which it refers to, "according to claim 1".

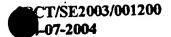
The reference for which claims 5 and 6 is referred and dependent to is incorrect. The protection for the matter of the interpretation of the invention, in order to achieve the claimed invention, is related to "claims 1-4". Therefore, the statement of technical features of the invention should be changed to this.

The matter for which claim 7 is sought for shall be in the terms of technical features of the invention. As far as the interpretation of the invention, in order to achieve the claimed invention, the claim should be referred and dependent to claim 6. Therefore, it should be changed to this.



CLAIMS

- 1. Industrial robot having a first part (7) and a second part (5) that are arranged to be movable with respect to each other where at least one cable (11) extends from the first part (7) to the second part (5) via an internal cavity (12), **characterized** in that an excess of cable extends freely through the internal cavity (12) from the first part (7) to the second part (5) and that said at least one cable is connected to at least one of the parts via a releasable contact point (10) that is located inside the internal cavity (12).
- 2. Industrial robot according any preceding claims, **characterized** in that one of said parts rotates or pivots about the other part.
- 3. Industrial robot according to any preceding claims, characterized in that one of the parts comprises an electric motor (8).
- 4. Industrial robot according to any preceding claims, characterized in that said excess of cable (11) forms an arch inside the internal cavity (12).
- 5. Industrial robot according to any of claims 1-6, **characterized** in that said excess of cable (11) forms a spiral inside the internal cavity (12).
- 6. Industrial robot according to any of claims 1-6, **characterized** in that said excess of cable (11) forms an S-shape inside the internal cavity (12).
- 7. Industrial robot according to claim 9, **characterized** in that the excess of cable (11) extends along an inner wall of the internal cavity (12).
- 8. Method of connecting at least part of at least one cable (11) between a first (7) part and a second part (5) of an industrial robot which are arranged to be movable with respect to each other where said at least one cable (11) extends from a first contact/securing point (10) on the first part (7) to a second contact/securing point



on the second part (5) via an internal cavity (12), characterized in connecting/securing said at least one cable to the first contact/securing point (10), moving the first and second contact/securing points into a position where they are furthest from each other, extending a length of cable (11) freely through the internal cavity (12) from the first contact/securing point (10) to the second contact/securing point (13) and connecting/securing said at least one cable releasably to the second part (5).